"We collaborate closely with zoos to maintain captive populations genetically healthy. Examples are studies on the giant panda in Ouwehands Zoo, Visayan warty pig in Blijdorp and San Diego Zoo, baboons in Emmen and collaboration with the CRC in Antwerp"

Centre of Excellence

WUR-ABG is the centre of excellence for all national and international animal breeding and genomics activities of Wageningen University & Research.

Our Clients

WUR-ABG is a preferred knowledge and business partner for many national and international clients from both the public and private sector. Our clients include breeding organisations in commercial and non-commercial livestock, pet animals and horses, the EU and national and foreign governments. We conduct statutory research tasks on behalf of the Dutch government to conserve the genetic diversity of species important for agriculture and forestry in the Netherlands in the Centre for Genetic Resources (CGN). We are always open to discuss future partnerships with potential clients.

"Increasing our understanding of genotype-phenotype relationship for complex traits"

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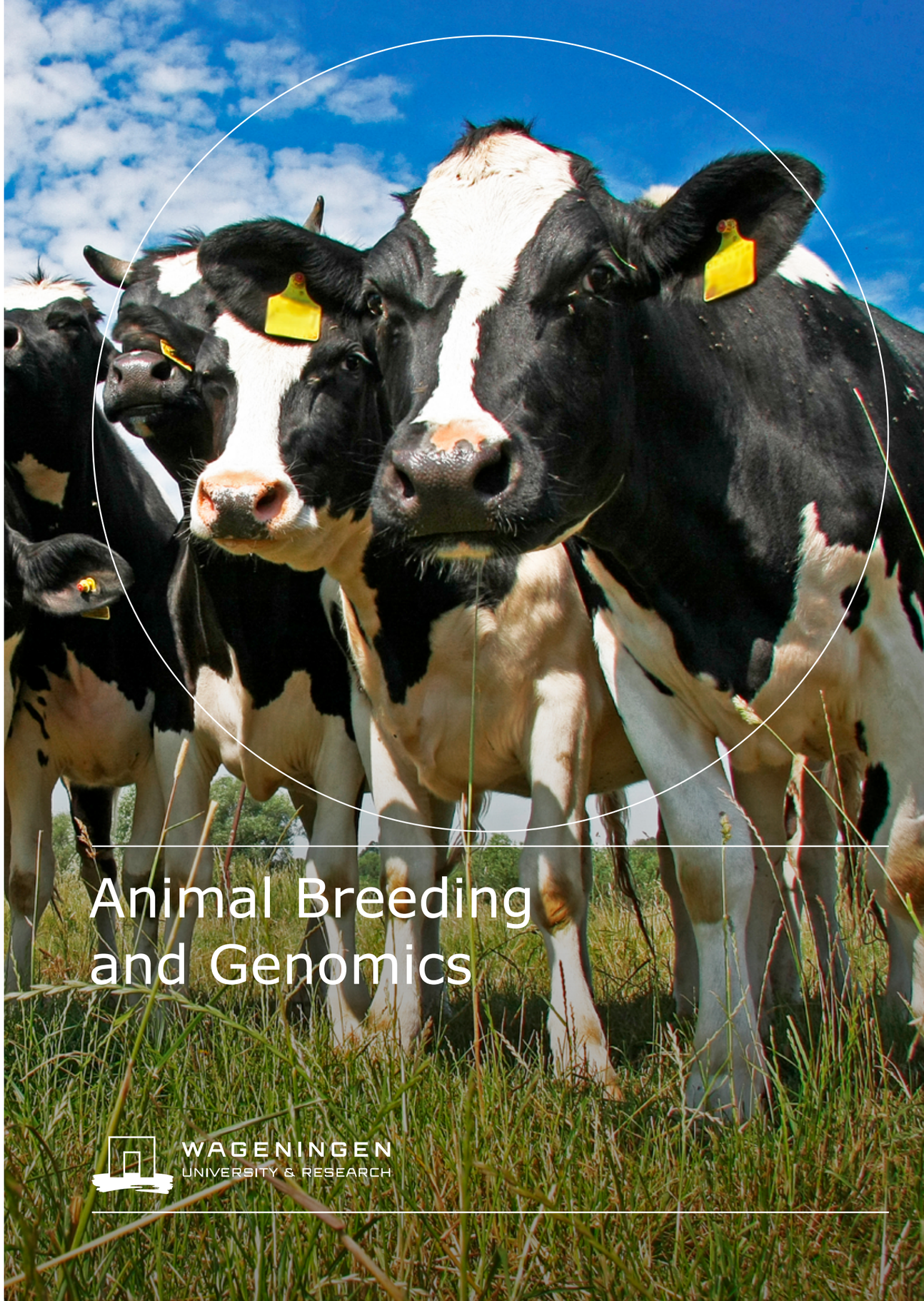
The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 10,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.

www.wur.eu/animalbreedinggenomics



Animal Breeding and Genomics

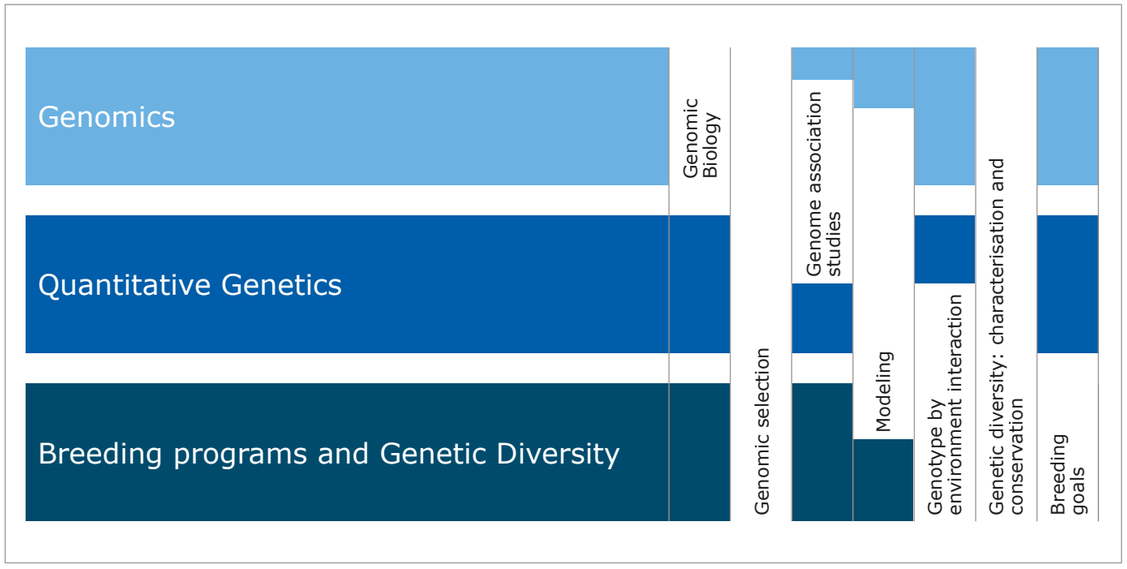
WAGENINGEN
UNIVERSITY & RESEARCH

Animal Breeding and Genomics

Animal breeding aims to improve health, welfare and productivity of animals and makes it possible to produce high-quality, healthy and safe animal products. Wageningen University & Research Animal Breeding & Genomics (WUR-ABG) encompasses the chair group Animal Breeding and Genetics and the department of Genomics of Wageningen Livestock Research. WUR-ABG is involved in both research and education, and focuses on understanding and utilising genetic differences between animals for food production, companionship, and nature conservation.

Area of expertise

Genetic selection of animals on production aspects alone is not adequate. Today's breeding also requires selection criteria for a broad range of characteristics, many of which are not easy to measure such as animal health, environmental impact and fertility. To realise our mission *"To perform excellent animal breeding and genomics research and education to create knowledge that contributes to sustainable livestock and fish production in an international context"* we are organised in three research themes: Genomics, Quantitative Genetics and Breeding programmes and Genetic Diversity. Innovations at WUR-ABG contribute to meet the future demand for safe and healthy food, while reducing environmental impacts by making better use of resources. We generate knowledge on genetic change in populations by integrating expertise in genomics, quantitative genetics and breeding programmes. This knowledge is used to explore origin and role of genetic variation in animals and analyse genetic variation at molecular and population levels. We apply our expert knowledge to determine genetic relationships between welfare, productivity and resource efficiency. Moreover, we exploit and maintain genetic variation in breeding programs.



Education

WUR-ABG organises courses for BSc, MSc, and PhD students. Animal Breeding and Genetics is one of six specializations within the Master Animal Sciences. During the Master, students can choose between a quantitative and molecular genetics profile, that both consist of two mandatory courses and one or more optional courses. Animal Breeding and Genetics is the recommended introductory course for both profiles. Students interested in wildlife and genetics can follow the BSc minor Wildlife biodiversity.

Short description of courses
Our courses cover the basic principles of genetics and animal breeding in both domesticated and natural populations. Students learn how to estimate the genetic disposition in animals, to design breeding programs, and to develop statistical models to describe biological phenomena. We also offer courses in which students learn to answer biological questions using genomic information. Other courses focus on the evolution of life history traits and conservation issues of wild populations.

Thesis projects
We offer a great variety of thesis and internship topics. Study populations vary from zoo populations and fish/shellfish species to farm animals and rare/primitive breeds. Research topics include, but are not limited to: biodiversity, breeding programmes, marker-trait associations, genomic prediction, genome sequencing, annotation of genes, gene expression, bioinformatics and population genetics. Our collaboration within Breed4Food (see highlights) offers a unique opportunity for students to participate in scientific research within WUR that is directly applicable in practice.

"WUR-ABG provides education and generates knowledge on the role and sustainable use of genetic variation in animals"

Research

We perform research on a wide spectrum from evolution, to domestication and selection of livestock species. The research involves development of molecular tools (detection and use of genetic markers, genome assemblies, gene annotation), design and analysis of genome-wide association studies (GWAS), development of statistical models and novel breeding programs, understanding the genotype-phenotype relationship for complex traits, epigenetics and genome (re-)sequencing. WUR-ABG has developed expertise and research lines in three interrelated areas:

- Genomics: identification and study of the role of individual genes (molecular genetics and bioinformatics).
  Example: Whole genome sequencing of multiple individuals of a species (e.g. pig, cow, chicken, turkey, great tit) to address research questions related to speciation, population dynamics and selection.
- Quantitative Genetics: genome-wide associations, statistical models for genetic analysis
  Example: Providing tools for improved breeding programs to exploit natural genetic variation in quantitative traits.
- Breeding Programs: The definition of breeding objectives and the design of breeding programs
  Example: Improving traits in group-living animals through tailor-made breeding programs. Genomic selection and rotational mating are used as design parameters.